



**—HELICOPTERS, INC.**

GULF COAST DIVISION  
LAKE CHARLES, LOUISIANA

## PROCESS SPECIFICATION

PROCESS SPECIFICATION NUMBER: ERA-1012

412 Auxiliary Fuel Tanks

FINAL FINISHING OF THE TANK EXTERIOR

PREPARED BY:

*John E. Stanley*  
John E. Stanley  
MESH PLASTICS LTD.

DATE: 1/27/87

### APPROVALS

MANUFACTURING	QUALITY CONTROL	ENGINEERING	
<i>Paul W. Dickens</i>	<i>John E. Stanley</i>	<i>Paul P. E.</i>	MESH
<i>R. F. Linner</i>	<i>David K. Murphy</i>	<i>David K. Murphy</i>	ERA



## PROCESS SPECIFICATION

**Scope:** This specification outlines the requirements for the final finishing of the exterior, and leak testing, of the 412 Auxiliary Fuel Tanks.

**Conformation:** This specification does not conform to any existing government specification.

**Subcontractors:** MESH PLASTICS, LTD. of Lake Charles, Louisiana, or its subcontractor shall be the only subcontractors qualified to construct the FRP requirements and shall comply with this process specification. Any deviations or variations are to be submitted to ERA for approval with proper documentation prior to fabrication.

**Conflicts:** In the event of a conflict with engineering drawing(s) and this specification, the drawing(s) shall govern.

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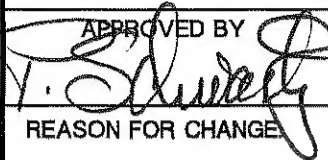
Final finishing of the exterior,  
and leak testing of the  
412 Auxiliary Fuel Tanks

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Rev	Date	Pages	Approvals					
			Manufacturing		Quality Control		Engineering	
			MESH	ERA	MESH	ERA	MESH	ERA
IR	1/27/87		<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>
A	2/12/87	5 (REISSUE)	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>
B	3/4/87	5,6 Re-issue	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>
C	11/4/87	5	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>

MATERIALS

<u>MATERIAL</u>	<u>NAME</u>	<u>MANUFACTURER</u>
Resin	Derakane 8054	Dow Chemical Midland, MI
Promoter	Cobalt Napthenate	AKZO Chemie New Brunswick, NJ
Accelerator	Dimethylaniline	Buffalo Colors West Paterson, NJ
MEKP Catalyst	Hi Point 90	Witco Chemical Richmond, CA
	Lupersol DHD 9	Lucidol Chemical Buffalo, NY
Mold Release	FVA	Rexco Carpenteria, CA
	Cerea Mold Release Wax	Ceara Products, Inc. Denver, CO
UV Inhibitor	UV-9	Industrial Chemicals Atlanta, GA
Pigment	CoPlas pigment	CoPlas Ft. Smith, AR
	Spartan pigment	Spartan Pigments Houston, TX
Gel Coat	Gel Coat	CoPlas Ft. Smith, Ark.

DATE 6/26/95	<b>ENGINEERING ORDER</b>		E.O. No. D-1	SHT. 1 OF 1
BY T. Harville	TITLE PROCESS SPECIFICATION		DWG. AFFECTED 1012	
APPROVED BY 			ENTERED ON COMPUTER BY: DATE:	
REASON FOR CHANGE: ADD ALT P/N FOR 3/4 & 1 1/2 oz TYPE "E" GLASS MAT (M127)				
<p>3/4 oz TYPE "E" GLASS MAT.    M113-3/4 oz    CERTAINTeed  OR  M127-3/4 oz    CERTAINTeed  WICHITA FALLS, TX.</p> <p>1 1/2 oz TYPE "E" GLASS MAT.    M113-1 1/2 oz    CERTAINTeed  OR  M127-1 1/2 oz    CERTAINTeed  WICHITA FALLS, TX.</p>				

ERA PS 1012

REV B

DATE 3/4/87

MATERIALS

<u>MATERIAL</u>	<u>NAME</u>	<u>MANUFACTURER</u>
Putty filler (Amorphous Fumed Silica)	Aerosil	Dequssa Corp. Teterboro, NJ
	Cabosil	Cabot Corp. Boston, MA
Milled Fibers	731 ED	Owens-Corning Anderson, S.C.
3/4 oz Type 'E' glass mat	M113 - 3/4 oz.	Certainteed Wichita Falls, TX

ERA PS 1012REV BDATE 3/4/87MATERIALS

<u>MATERIAL</u>	<u>NAME</u>	<u>MANUFACTURER</u>
Paraffinated Styrene	TF-100	Industrial Chemicals Atlanta, GA
Grinding Discs	36 Grit Type D 60 Grit Type C 80 Grit Type C	3M Corp. St. Paul, MN
Mold surface	Black Tooling Gel	Glidden
Wet/Dry Sandpaper	100 Grit 320 Grit 400 Grit 600 Grit	3 M Corp. St. Paul, Minn.
Polishing Compound	852 Universal	Inmont Corp. Detroit, Mich.

LEAK TESTING

NOTE: LEAK TESTING IS TO BE PERFORMED AFTER ALL HOLES HAVE BEEN DRILLED AND PRIOR TO FINAL FINISHING.

- 1) Blank off all openings in the tank using proper gaskets prior to testing.
- 2) Place tank in empty test vat and strap down securely.
- 3) Using a manometer and air regulator, raise internal pressure to 2 psig.
- 4) Fill test vat with water until tank is completely submerged.
- 5) Keep tank submerged for 15 min. with regular checks for visible leaks. If no visible leaks occur the maximum allowable pressure drop is 0.2 psig.
- 6) Drain test vat and depressurize the tank.
- 7) If leak is found, red tag tank and set aside for engineering inspection. If leak is determined to be a minor non-structural leak, repair in accordance with ERA Process Spec. 1016 and retest.

FINISHING

- 1) Lightly sandblast mold joint on the outside of tank shell.
- 2) Sand smooth any area protruding up from molded surface.
- 3) Fill any low areas with 3/4 oz. type E glass mat. Saturate completely with Derakane 8084 containing UV inhibitor and pigment. Deaerate with serrated rollers.
- 4) Sand area that has received fill in back to the original contour.
- 5) Recess area the size of the serial # tag approximately 0.06" deep in the area shown on the drawing.
- 6) Apply a coat of Derakane 8084 resin containing UV inhibitor to the recessed area. Press tag into wet resin and hold in place until resin hardens.
- 7) Apply one layer of 10 mil veil over tag. Saturate with clear gel coat containing UV inhibitor. Deaerate with serrated rollers. Allow to cure until tack free.

FINISHING - Cont.

- 8) Hot coat all sanded areas with gel coat containing UV inhibitor with a spray gun. Apply three separate coats, allowing the gel coat to dry between coats.
- 9) Apply wax coat over hot coated areas with gel coat containing UV inhibitor and paraffinated styrene. Allow to cure for 4 hours.
- 10) Sand smooth all areas that have been recoated with gel coat.
- 11) Sand complete tank exterior with wet/dry sandpaper until surface is smooth and uniform. Buff with electric buffer and polishing compound.



## INSPECTION

It is the purpose of the inspection to verify that each part has been fabricated in accordance with and meets the requirements of this specification.

**RESPONSIBILITIES:** It is the responsibility of the fabricator to make available to ERA Helicopter or his authorized representative any or all of the following:

**Records:** Records pertaining to the part(s) being purchased shall be supplied when requested. These may include:

- Materials specifications
- Equipment drawings or mold jig
- Materials test results.
- Dimensional verification reports.
- Rework and repair reports.

**MATERIALS:**

Raw materials used for laminates shall be virgin materials and shall be free of contaminants as described on Pgs. 10 and 11.

**FABRICATED PARTS:** The part to be inspected shall be properly located and positioned, and shall be in condition to permit safe and thorough inspection. Reasonable means shall be provided to permit the inspector to visually examine the entire inner and outer surfaces of the part.

Allowable defects are as listed in Pgs. 8 and 9.

The following inspection tools and equipment shall be made available for use by the inspector.

- Barcol hardness tester.
- Acetone squeeze bottle with acetone.
- Extension cord with ground fault switch.
- A vapor tight inspection light.
- Thickness gauge.

## INSPECTION

### TEST OF FINISHED PARTS:

The following basic tests shall be included as a minimum in the Acceptance Inspection.

Barcol Hardness Test - A test of resin cure shall be made in accordance with ASTM D2563. Take 10 readings, discard highest and lowest, average the remaining. Minimum acceptable average reading is 30.

Surface Cure Test - An acetone test shall be used to detect surface inhibition on surfaces exposed to air during cure. The procedure that shall be used is the following: rub a few drops of acetone on the surface and check for tackiness after the acetone has evaporated. Persistent tackiness indicates incomplete cure.

Dimensions - The inspector shall be provided with copies of all approved drawings or mold jigs.

### APPLICABLE DOCUMENTS:

#### ASTM Standards

C 581-74-Test Method for Chemical Resistance of Thermosetting Resins Used in Glass Fiber Reinforced Structures.

D 638-77a-Test method for Tensile Properties of Plastics.

D 790-71-Test Methods for Flexural Properties of Plastics and Electrical Insulating Materials.

D 883-78a-Definitions of Terms Relating to Plastics.

D 2563-75-Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor.

## ALLOWABLE DEFECTS

Defect	Surface inspected
Cracks(Through part)	None
Crazing (fine surface cracks)	Max dimension 1/2 in., max density 5 per sq. ft. min 2 in apart
Blisters(rounded elevations of the laminate surface over bubbles)	Max 1/4 in., dia x 1/8 in. high, max 1 per sq ft, min 2 in apart
Wrinkles and solid blisters	Max deviation, 20% of wall thickness but not exceeding 1/8 in.
Pits(craters in the laminate surface)	Max dimensions, 1/8 in dia x 1/16 in deep, max density 10 per sq. ft.
Surface porosity(pin-holes or pores in the laminate)	Max dimensions, 1/16 in dia. x 1/16 in deep, max density 10 per sq. ft.
Chips	Max dimension of break, 1/4 in, and thickness no greater than 20 percent of wall thickness, max density 1 per sq ft
Dry spot(nonwetted reinforcing)	Max dimension, 2 sq in. per sq ft
Entrapped air (bubbles or voids in the laminate)	1/8 in. max dia, 4 per sq in. max density; 1/16 in. max dia. 10 per sq in. max density

ERA PS 1012REV BDATE 3/4/87

## ALLOWABLE DEFECTS

<u>Defect</u>	<u>Surface inspected</u>
Exposed Glass	None
Burned Areas	None
Exposure of cut edges	None
Scratches	Max length 1 in. max depth 0.010 in.
Foreign Matter	1/16 in.dia, max density 1 per sq ft

## FIBERGLASS CHOPPED STRAND MAT

## 1.0 Scope

1.1 The scope of these procedures is to describe the visual, physical and mechanical parameters which characterize fiberglass chopped strand mat used by the fabricator.

## 2.0 Definitions

2.1 Chopped Strand Mat - Chopped strand mat is made from randomly oriented glass strands which are held together in mat form using a binder. Each strand contains a sizing.

## 3.0 Requirements

3.1 Visual Requirements - Each roll of chopped strand mat shall be inspected to insure it is consistent in color, texture and appearance. It shall be free from surface irregularities, fluffy masses, dirt spots or other foreign material; water spots, knots, binder spots larger than 2" in diameter, clumps of strands and tears or holes which may result from removal of defects.

## 3.2 Physical Requirements

3.2.1 Weight - The square foot weight of the mat shall be measured for each carton of mat used. All specimens shall fall within the range specified for the product.

3.3 Packaging Requirement - Packaging shall be visually inspected to assure proper labeling and that the package is free from damage that may render the mat unusable.

3.3.1 The mat shall be packaged in an unbroken carton as shipped from the mat manufacturer's factory. The mat used shall not be repackaged in the distribution of the mat after the manufacturer has shipped the mat.

## FIBERGLASS CHOPPED STRAND MAT

3.4 Documentation - It is the responsibility of the fabricator to maintain records showing the results of all material testing. This information shall show at a minimum, the following:

- (a) Form of material
- (b) Manufacturer
- (c) Manufacturer's product description including binder type (treatment)
- (d) Manufacturer's product code
- (e) Production date, if available, or production code on carton.
- (f) Property measured and value recorded

- \* Visual inspection
- \* Width
- \* Thickness
- \* Packaging

- (g) Job number (Internal Fabricator Control Number)
- (h) Fabricated part identification number

LEAK TESTING

NOTE: LEAK TESTING IS TO BE PERFORMED AFTER ALL HOLES HAVE BEEN DRILLED AND PRIOR TO FINAL FINISHING.

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- 6) Drain test vat and depressurize the tank.
- 7) If leak is found, red tag tank and set aside for engineering inspection. If leak is determined to be a minor non-structural leak, repair in accordance with ERA Process Spec. 1016 and retest.

FINISHING

- 1) Lightly sandblast mold joint on the outside of tank shell.
- 2) Sand smooth any area protruding up from molded surface.
- 3) Fill any low areas with 3/4 oz. type E glass mat. Saturate completely with Derakane 8084 containing UV inhibitor and pigment. Deaerate with serrated rollers.
- 4) Sand area that has received fill in back to the original contour.
- 5) Recess area the size of the serial # tag approximately 0.06" deep in the area shown on the drawing.
- 6) Apply a coat of Derakane 8084 resin containing UV inhibitor to the recessed area. Press tag into wet resin and hold in place until resin hardens.
- 7) Apply one layer of 10 mil veil over tag. Saturate with clear gel coat containing UV inhibitor. Deaerate with serrated rollers. Allow to cure until tack free.



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# REVISED

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Final finishing of the exterior  
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			MESH	ERA	MESH	ERA	MESH	ERA
IR	1/27/87	ALL	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>

PAGE 1 of 11

ERA PS 1012

REV IR

DATE 1/27/87

MATERIALS

<u>MATERIAL</u>	<u>NAME</u>	<u>MANUFACTURER</u>
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Promoter	Cobalt Napthenate	AKZO Chemie New Brunswick, NJ
Accelerator	Dimethylaniline	Buffalo Colors West Paterson, NJ
MEKP Catalyst	Hi Point 90	Witco Chemical Richmond, CA
	Lupersol DHD 9	Lucidol Chemical Buffalo, NY
Mold Release	PVA	Rexco Carpenteria, CA
	Cerea Mold Release Wax	Ceara Products, Inc. Denver, CO
UV Inhibitor	UV-9	Industrial Chemicals Atlanta, GA
Pigment	CoPlas pigment	CoPlas Ft. Smith, AR
	Spartan pigment	Spartan Pigments Houston, TX
Gel Coat	Gel Coat	CoPlas Ft. Smith, Ark.

PAGE 2 of 11

ERA PS 1012REV IRDATE 1/27/87MATERIALS

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Grinding Discs	36 Grit Type D 60 Grit Type C 80 Grit Type C	3M Corp. St. Paul, MN
Mold surface	Black Tooling Gel	Glidden
Wet/Dry Sandpaper	100 Grit 320 Grit 400 Grit 600 Grit	3 M Corp. St. Paul, Minn.

FABRICATION

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- 4) Sand area that has received fill in back to the original contour.
- 5) Hot coat all sanded areas with gel coat containing UV inhibitor with a spray gun. Apply three separate coats, allowing the gel coat to dry between coats.
- 6) Apply wax coat over hot coated areas with gel coat containing UV inhibitor and parrifinated styrene. Allow to cure for 4 hours.
- 7) Sand smooth all areas that have been recoated with gel coat.
- 8) The final step prior to shipment is to wet sand the complete tank exterior with wet dry sandpaper until the surface is smooth and uniform.

## INSPECTION

It is the purpose of the inspection to verify that each part has been fabricated in accordance with and meets the requirements of this specification.

**RESPONSIBILITIES:** It is the responsibility of the fabricator to make available to ERA Helicopter or his authorized representative any or all of the following:

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- Barcol hardness tester.
- Acetone squeeze bottle with acetone.
- Extension cord with ground fault switch.
- A vapor tight inspection light.
- Thickness gauge.

## INSPECTION

TEST OF FINISHED  
PARTS:

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Barcol Hardness Test - A test of resin cure shall be made in accordance with ASTM D2583. Take 10 readings, discard highest and lowest, average the remaining. Minimum acceptable average reading is 30.

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Dimensions - The inspector shall be provided with copies of all approved drawings or mold jigs.

## APPLICABLE DOCUMENTS:

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D 2583-75-Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor.

## ALLOWABLE DEFECTS

Defect	Surface inspected
Cracks(Through part)	None
Crazing (fine surface cracks)	Max dimension 1/2 in., max density 5 per sq. ft. min 2 in apart
Blisters(rounded elevations of the laminate surface over bubbles)	Max 1/4 in., dia x 1/8 in. high, max 1 per sq ft, min 2 in apart
Wrinkles and solid blisters	Max deviation, 20% of wall thickness but not exceeding 1/8 in.
Pits(craters in the laminate surface)	Max dimensions, 1/8 in dia x 1/16 in deep, max density 10 per sq. ft.
Surface porosity(pin-holes or pores in the laminate)	Max dimensions, 1/16 in dia. x 1/16 in deep, max density 10 per sq. ft.
Chips	Max dimension of break, 1/4 in, and thickness no greater than 20 percent of wall thickness, max density 1 per sq ft
Dry spot(nonwetted reinforcing)	Max dimension, 2 sq in. per sq ft
Entrapped air (bubbles or voids in the laminate)	1/8 in. max dia, 4 per sq in. max density; 1/16 in. max dia. 10 per sq in. max density



ERA PS 1012REV IRDATE 1/27/87

## ALLOWABLE DEFECTS

<u>Defect</u>	<u>Surface inspected</u>
Exposed Glass	None
Burned Areas	None
Exposure of cut edges	None
Scratches	Max length 1 in. max depth 0.010 in.
Foreign Matter	1/16 in.dia, max density 1 per sq ft.

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## 3.0 Requirements

3.1 Visual Requirements - Each roll of chopped strand mat shall be inspected to insure it is consistent in color, texture and appearance. It shall be free from surface irregularities, fluffy masses, dirt spots or other foreign material; water spots, knots, binder spots larger than 2" in diameter, clumps of strands and tears or holes which may result from removal of defects.

## 3.2 Physical Requirements

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## FIBERGLASS CHOPPED STRAND MAT

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- (a) Form of material
- (b) Manufacturer
- (c) Manufacturer's product description including binder type (treatment)
- (d) Manufacturer's product code
- (e) Production date, if available, or production code on carton.
- (f) Property measured and value recorded

- \* Visual inspection
- \* Width
- \* Thickness
- \* Packaging

- (g) Job number (Internal Fabricator Control Number)
- (h) Fabricated part identification number